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10 August 1967

Dear Sir:

In accordance with the provisions of the referenced contract, we are enclosing herewith three (3) copies of

635 OPERATIONS MANUAL.

Very truly yours,

Executive Vice President

LHB/aw
Encs. (3)

DDR-DUPE

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ROOM NO.	BUILDING	
REMARKS: <i>FILE # 997265</i> <i>FD</i>		
FROM: OL/PD/CA&SB/CAS/1036 Ames Bldg. [REDACTED]		
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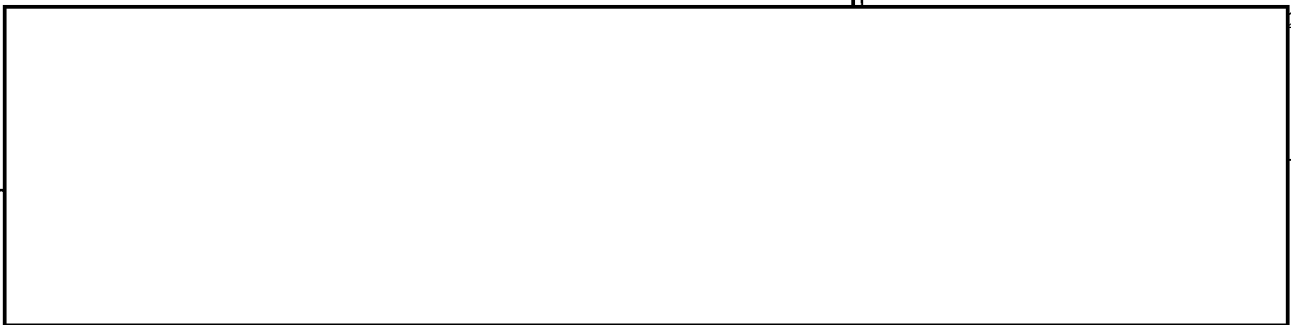
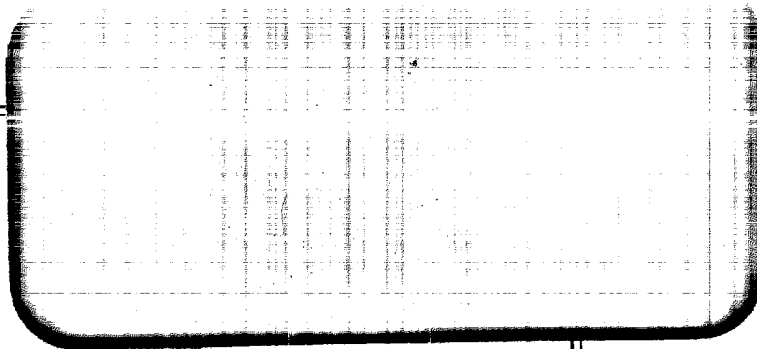
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REPLACES FORM 36-8
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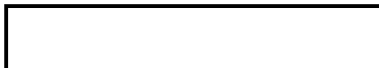


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OPERATIONS MANUAL

PREPARED BY:



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TABLE OF CONTENTS

<u>SECTION</u>		<u>PAGE</u>
1.0	General Description	1
2.0	Functional Description	2
2.1	General Illumination	2
2.2	High Intensity Tracking Lights	2
2.3	Film Transport System	3
2.4	Holddown Platen Operation	4
2.5	Elevation Mechanism	4
2.6	Eyepiece Extension	5
3.0	Controls - Location and Function	5
3.1	Power Switch	5
3.2	Pilot Light	5
3.3	Platen Switch	5
3.4	Brightness Controls	5
3.5	Tension	6
3.6	High Intensity Light	6
3.7	High Intensity Light Dimmers	6
3.8	High Intensity Light Filter	6
3.9	High Intensity Light Master Magnets	6
3.10	Shade Control	6
3.11	Film Transport Control	7
3.12	Film Threading Switch	7
3.13	Film Threader	7
3.14	X-Y Carriage Position	7
3.14.1	Y Position Control and Engagement Lever	7
3.14.2	X Position Control and Engagement Lever	8

635 Operations Manual

TABLE OF CONTENTS

<u>SECTION</u>		<u>PAGE</u>
	3.15 Platen Props	8
	3.16 Interpupillary Distance	8
	3.17 Eyepiece Focussing	8
	3.18 Stereoscope Adjusting Screws	9
	3.19 Elevation Control	9
4.0	Operation	9
	4.1 Setting Up	9
	4.2 Power Requirements	9
	4.3 Film Loading and Threading	9
	4.4 Film Transport	11
	4.4.1 Slew Control	11
	4.4.2 Platens	11
	4.4.3 Tension	12
	4.5 General Illumination	12
	4.6 High Intensity Tracking Lights	13
	4.7 Shades	14
	4.8 Adjustment of Instrument Height	15
	4.9 Microscope Eyepiece Extension	15
5.0	General Maintenance	15
	5.1 Glass Cleaning	15
	5.2 Cleaning of Rollers	16
	5.3 Replacement of High Intensity Lamps	16
	5.4 Fuse Replacement	16
	5.5 Pilot Light Replacement	16

635 Operations Manual

TABLE OF CONTENTS

FIGURES

- | | |
|----------|---|
| Figure 1 | High Intensity Tracking Light Source
Drawing Number 113383 |
| Figure 2 | Film Transport System
Drawing Number 113382 |
| Figure 3 | Controls
Drawing Number 800958 |

635 Operations Manual

1.0 General Description

The 635 viewing is designed basically as a superior mount for the Versatile Stereoscope. It has two 20" by 10" cold cathode fluorescent illuminated formats for viewing corresponding images on two 500' rolls of 9 1/2" wide film. It can also use film widths of smaller size. In addition to the general illumination, it features a high intensity tracking light source on each format. These sources are more than ten times brighter than the general format illumination and are used with high magnifications and dense photography. The positions of the sources are slaved to the stereoscope as it moves, using magnetic couplings through the glass platen.

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The projection lamps for the tracking light sources are located on the outside of the instrument where they can dissipate heat and are accessible for bulb replacement. The light after being condensed, is piped into the viewing area using fiber optics cables. Aside from increasing the accessibility of the projection bulbs, it eliminates heat on the film surface.

The high intensity sources are individually adjustable in brightness and there is provisions for insertion of neutral density or color correction filters in the optical path.

The microscope is mounted on a carriage assembly which permits it to be positioned over the area of interest. Two speed controls on the X and Y carriage motion permit coarse and fine positioning. The microscope mount and general instrument construction is designed to minimize the effect of external and operator induced vibration on the motion sensitive stereoscope rhomboids.

635 Operations Manual

The film spools are located at the rear of the instrument away from the operator. Each film is automatically transported using a unique motorized drive that also maintains film tension regardless of speed or acceleration. A single knob controls the direction and speed of film transport.

Film is held flat on the viewing surface by glass pressure platens. The platens raise up automatically when the film is transported and lower when the film is stationary.

The entire instrument is built into an elevating frame supported on a castored (with locks) stand. A motor and gear train permits effortless and precise adjustment of the height by the operator.

To increase operator comfort and improve his efficiency, an eyepiece extension is supplied which permits the operator to use a normal office type chair and yet be in excellent viewing position at all stereoscope positions.

2.0 Functional Description

2.1 General Illumination - The two 10" X 20" formats are illuminated with cold cathode fluorescent lamp grids each equipped with a plastic diffuser to give uniform illumination. Each grid brightness is controlled by a Silicon Controlled Rectifier Phase Angle Control. The controls are on the front panel. All the electronics and transformers required are mounted in the electronics rack on the rolling stand.

2.2 High Intensity Tracking Lights - The tracking lights use an optical system as is shown in Figure (1). A small 30

635 Operations Manual

watt, 6 volt projection bulb is used to illuminate one end of the fiber optic cable through two aspheric condenser lenses. The light travels through the cable and exits from the other end being reflected by the mirror and concentrated on the microscope objective by another short focus condensing lens. A leaf type iris in the optical path permits the dimming of the light through a 20:1 range without changing the color temperature. Provision is provided for the insertion of a filter and a blue filter is supplied with the unit to make the color of the high intensity source closer to that of the general illumination.

The mirror and condensing lens for each tracking light source is mounted on a magnet assembly which is positioned by a complimentary magnet array mounted on an adjustable arm attached to the stereoscope mount.

2.3 Film Transport System - There are two independent identical film transport systems. A schematic of this system is shown in Figure (2). The slew control knob turns the shaft of a potentiometer. The electrical signal from the potentiometer is amplified and used to drive the slew motor at a rate proportional to the signal. The amplifier maintains motor speed constant for any potentiometer setting by using the induced residual armature voltage in the motor as a tachometer feedback signal. A magnetic particle brake maintains a resistance torque on the payout spool and thus maintains film tension. To control the tension, the support force at one end of the roller is sensed by semi-conductor strain gages and this signal, after amplification, is used to decrease film tension if it exceeds a certain preset value. When

635 Operations Manual

driving in the other direction, the cam actuated switches on the slew potentiometer shaft reverses the roles of the drive clutch and restraining brake.

When the potentiometer is rotated to its extreme position, another switch (not illustrated) is actuated which applies full voltage to the motor for maximum slew speed.

A switch is provided on the side of the unit to reverse the direction of the motor. This allows one to load the spool so that the film is taken from either the top or bottom of the roll.

2.4 Holddown Platen Operation - The glass pressure or holddown platens are actuated by linear induction motors. Limit switches are operated at both ends of the travel to remove voltage from the motor actuators.

Normally, with the film stationary, the platens are in the down position. As the slew control is advanced applying voltage to the slew motor, a sensitive relay activates and raises the platen. An override switch is provided to keep both platens in the up position for film loading.

2.5 Elevation Mechanism

The elevation mechanisms which permit the operator to adjust the height of the table, consist of a motor, gear train, and associated control circuitry. The motor is a very quiet split phase capacitor-start type controlled by the "Raise-Lower" switch thru relays. A separate relay prevents the motor from being re-

635 Operations Manual

versed until it has slowed to a safe speed and a mechanical interlock on the "Raise-Lower" switch prevents simultaneous actuation of both the raise and lower buttons.

Limit switches deactivate the motor from driving further at either extreme of motion.

2.6 Eyeiece Extension

The stereoscope eyepiece extension allows the operator to use a regular office chair when viewing thru the stereoscope. The extension mounts on a plate supported by the scope mounting ring. It consists of two identical optical relays. The regular eyepieces are also used with the extension.

3.0 Controls - Location and Function (See Figure 3)

3.1 Power Switch - The main power switch (1) is located on the right control panel. It controls all power to unit.

3.2 Pilot Light - The pilot light (2) is located on the right control panel. It indicates when power is being supplied to unit.

3.3 Platen Switch - The platen switch (3) is located toward the top of the left control panel. In the "UP" position it raises both platens.

3.4 Brightness Controls - There are two brightness controls (4) and (5) one located on each control panel. Clockwise rotation of the knob increases general illumination brightness. Full counterclockwise rotation shuts the illumination off.

635 Operations Manual

- 3.5 Tension - There are two tension controls (6) and (7), one located on each control panel corresponding to the film drive it controls. Since this control is seldom used; it is provided with a lock to prevent accidental operation.
- 3.6 High Intensity Light - This switch (8) is on the left hand panel it controls both high intensity sources.
- 3.7 High Intensity Light Dimmers - Dimming of the high intensity tracking sources is accomplished with controls (9) and (10) located on the lamp cartridge on either side of the equipment.
- 3.8 High Intensity Light Filter - A drop-in filter (11) and (12) is incorporated in each lamp cartridge on either side of the equipment. A blue filter is supplied with the unit.
- 3.9 High Intensity Light Master Magnet - The position controls (13) and (14) for the High Intensity Track Light Sources are located above the pressure platen on a frame suspended from the microscope mounting block. The arms holding the master magnets are held in position by friction. The operator needs only to overcome this friction to reposition the magnets.
- 3.10 Shade Control - Two control knobs (15 and 16) are located on either side of the unit toward the top rear. Rotation of the knobs toward the front of the instrument causes the shade to move across the format. Shade is held in position by friction.

635 Operations Manual

3.11 Film Transport Control - The control knobs (17 and 18) for the film transports are located at the front of the unit on either side. When film is threaded properly, direction of film travel and amount of rotation is proportional to film speed. A detent action and index marks indicates the center or OFF position.

3.12 Film Threading Switch - A switch (19 and 20) located on either side toward the rear of the unit, selects which threading configuration is used. A label on the switch shows schematically, the film paths for both switch positions.

3.13 Film Threader - A knob (21 and 22) on either side and toward the rear of the unit controls the position of the film threading bar. This bar may be used to pull the end of the film roll thru the film channel. Rotation of the knob toward the front of the unit will cause the bar to move toward the rear. When not in use, the film threader should be stowed at the rear of the instrument by rotating the threading knob toward the front until the threader bar lies up above the bottom rear roller and against the casting. This will insure that the bar will not rub on the film.

3.14 X-Y Carriage Position

3.14.1 Y Position Control and Engagement

Lever - These controls (23 and 24) are located on the front right corner of the Y carriage. The control is engaged when the lever is down and disengaged when up. Labels and mechanical

635 Operations Manual

stops on the lever indicate the proper positions. The position control is two-speed; the outer knob is for coarse positioning and the smaller inner knob is a limited travel vernier for fine positioning.

3.14.2 X Position Control and Engagement Lever

The X position control (25) is located on the top left side of the Y carriage and the engagement lever (26) is on the right side of the Y carriage. Operation of X controls is identical to operation of Y controls.

3.15 Platen Props - Platen props (27 and 28) are located at the outer edge of each format. These support the platen in its raised position. The stereoscope rhomboids must be swung out of the way before raising platen.

3.16 Interpupillary Distance - The knurled thumbscrew (29) on the microscope extension controls the interpupillary distance of the eyepieces. A scale on the instrument indicates this distances in metric units.

3.17 Eyepiece Focusing - Separate focusing adjustments (30) are provided on each eyepiece mount.

3.18 Stereoscope Adjusting Screws - The stereoscope mounting plate is positioned by four set screws (31) and locking nuts. These are adjusted to make the optical axes of the stereoscope perpendicular to the viewing surface.

635 Operations Manual

3.19 Elevation Control - A switch (32) with "RAISE" and "LOWER" indications is positioned just under the left side of the table. This switch controls the elevating motor.

4.0 Operation

4.1 Setting Up - The 635 should be located on a solid level surface. In addition, the site should be remote from areas of heavy traffic or machinery. This is to eliminate vibrations induced in the stereoscope rhomboids thru the frame of the instrument. The use of the locks (33) on the casters will prevent the instrument from moving during operation although their use is not a necessity.

4.2 Power Requirements - The instrument requires a source of 115 volt \pm 10 volts, 60 cps power. The source should be capable of delivering at least 15 amperes to the equipment. Select a source which is isolated from other heavy electrical equipment to minimize variations in light intensity which will occur when other equipment is turned on or off.

The unit is supplied with a standard three prong grounded plug. Make sure the source receptacle is the mating type. For safety do not defeat the purpose of the ground wire by using a non-grounding receptacle. If an adapter plug is used, ensure that the ground wire is connected to a good electrical ground.

4.3 Film Loading and Threading - Look at the legend plate on the side of the unit and decide which film path configuration you want to use. Actuate switch (19 or (20) accordingly. Next, position the idler casting to the position of the film spool size. Detents on the rod indicate the most commonly used film spool sizes. Tighten thumbscrew (34) or (35). Install empty reel on

635 Operations Manual

bottom by withdrawing idler spindle (36) and slipping spool end over the drive spindle.

Release idler spindle and make sure it enters proper hole in other end of spool and is in locked position. If it does not drop into its locked position, the idler casting may have to be spread out slightly. Install other film spool in upper position in a similar manner.

Turn on power switch (if not already on) and put Platen Switch (3) in "UP" position. This will raise the platens so that the film may be slipped thru. Pull off a length of film from the roll and slip it under the top back roller and under the pressure platen. Push film thru until the end emerges from front of unit. From the front, slip film in slot under unit and push thru until end emerges at rear. Tape film to take up spool or insert tapered leader in slot in spool. Check with ledger plate to see if the film path is correct and switch (19) or (20) is in the proper position. Also make sure threader bar is in its stowed position - that is, above the rear bottom roller and up against the casting. For most films the use of the threader bar is not required for pulling film thru bottom tray.

Rotate Slew Control Knob (17) or (18) toward front slowly until film starts to move and slack is removed. Platen switch may be put in "DOWN" position now.

For small width film or very flexible film base materials, pushing the film under the pressure platen or thru the slot under the table may not work. In which case, the platen may be

635 Operations Manual

raised and held in the UP position with its prop (27 or 28) while threading film and the film threader bar controller by crank (21 or 22) may be used to pull the end of the film from front to back. When using the threader bar, tape the end of the film to the bar and pull sufficient slack from the roll so that the threader will not have to pull film from the spool.

If difficulty is encountered in pulling film from the spool, shut off power while threading to remove voltage from the brakes.

4.4 Film Transport

4.4.1 Slew Control

After films are threaded and checked to see that the film paths correspond to those shown on the legend plates on threading switches 19 and 20, film may be transported on either or both sides by operating the appropriate slew control knob (17 or 18). Rotation of the knob toward the operator causes the film to move in the same direction and at a speed proportional to the amount of rotation. When the Slew Control Knob is rotated to its extreme position in either direction, full voltage is applied to the motor and maximum slew speed results in that direction. A detent and index mark indicates the null or off position.

4.4.2 Platens

With the Platen Switch (3) in the "DOWN" position, each platen will raise automatically only when the corresponding Slew Control Knob is rotated off the detent and the film is transported.

635 Operations Manual

When film is stopped, the platen is automatically lowered after an approximate two second delay. The delay is incorporated in the design to prevent excessive and unnecessary actuation of the platen which would result if the operator were moving the Slew Control Knob about the null position while making accurate adjustments on the film position.

With the Platen Switch (3) in the "UP" position, both platens are raised and remain in the up position, regardless of the position of the Slew Control Knob.

4.4.3 Tension

The tension controls (6 and 7) establish the level of tension in the film. Tension should be set to the lowest value which will allow film transport without excessive overrunning of the film spools when decelerating. To set tension, rotate the control full counterclockwise. Transport film, accelerating and decelerating, and observe film spillage. Rotate tension control clockwise until little or no film spillage occurs. Lock control in position. Excessive tension may stretch film and puts an unnecessarily heavy load on the transport mechanism and therefore should be avoided.

4.5 General Illumination

The general illumination format on each side is controlled by knobs on the respective control panels. Rotation of the knob clockwise increases brightness. Full counter-clockwise rotation shuts off the lamp grid entirely.

635 Operations Manual

When the format illumination is first turned on, there may be a slight noticable flicker. This will last for 5 or 10 minutes or until the lamps are warmed up.

A flicker or variation in intensity will be noticed whenever a machine connected to the same line is turned on. This also applies to the platen raising motors and the elevating motor within the unit. If interference of this type is found to be objectionable, it may be minimized by operating the lamp grids at full brightness.

4.6 High Intensity Tracking Light - These sources are controlled by the "ON-OFF" switch (8) on the left control panel. Intensity may be independently adjusted by using the iris diaphragm controls (9 and 10) on the lamp cartridges. A blue filter (11 and 12) is normally used to adjust the color temperature to that of the general format illumination, however, these may be removed to obtain an even brighter light if so desired.

The light sources may be placed under the rhomboid objectives by manipulating the position of the master magnets (14 and 15). The positioning arms are held in place by friction and may be readily moved.

At low magnifications, it may be necessary to adjust the position of the tracking source as the stereoscope is moved because of the wide field of view and the following error lag in the slave magnets.

635 Operations Manual

When not in use, the slave assemblies may be stowed at the rear of the format.

4.7 Shades - Each format has a shade which may be extended across the short dimension by turning the appropriate control knob (15 or 16). This permits the operator to mask out the unused portion of the format when the film width is less than 9-1/2 inches.

Care should be exercised in the use of the shade to insure that it does not interfere with the operation of the tracking light source.

4.8 Adjustment of Instrument Height - The height of the viewing surface may be adjusted by using the Elevation Control (32). The power for the raising mechanism is controlled also by the main power switch so this switch must be "ON."

Operation is straight forward, the motions of the table corresponding to the "RAISE" and "LOWER" labels on the switch. Limit switches are provided at both extremes of travel to prevent the mechanism from exceeding its mechanical limits. When the limit switch is operated, the motor is prevented from driving further in that direction, but is still capable of driving in the opposite direction.

Every effort has been made to make the elevating system as foolproof and fail-safe as possible; however, care should be taken to prevent foreign objects from falling into the rack pinion clearance slot which is exposed when the table is in the low position. Also the operator should be aware of the fact that

635 Operations Manual

the table can be lowered to a position where it would bear on his knees. The motion is very slow and this condition gives ample forwarning. Should the operator at any time be concerned about proper operation of the mechanism, he should remember that if the RAISE-LOWER Switch is not being actuated, the elevating motor cannot run and the table cannot move regardless of what malfunction exists.

4.9 Microscope Eyepiece Extension - The eyepiece extension should be installed by removing the eyepieces and slipping the assembly over the eyepiece housings. Tighten the extension in place with the chained thumbscrews making sure that the image rotation mechanisms on the stereoscope are not binding - shift extension slightly until they are free.

The original eyepieces are used on the extension also. Note that there is an interpupillary distance adjustment and both eyepieces can be focussed on the extension.

Due to the large cantilever effect of the extension on its mount, care should be exercised in applying force in the eyepiece area. Do not lean on the eyepiece extension!!

5.0 General Maintenance

5.1 Glass Cleaning and Maintenance - Glass surface (pressure platen and viewing surface) may be cleaned using a clean lint free rag or lens tissue moistened with lens cleaner. The glass pressure platen may be removed by swinging the stereoscope rhomboids to the side and lifting the plate out of its guides.

635 Operations Manual

5.2 Cleaning of Rollers - Chrome plated rollers may be cleaned with a solvent such as carbon tetra-chloride, acetone, methyl ethyl, ketone or a similar agent. Be careful not to get the solvent into the bearings.

5.3 Replacement of High Intensity Lamps - To replace lamps, press the knurled lamp mount into the cartridge slightly, rotate counterclockwise, and withdraw the bulb mount. Bulb base is of the bayonet type. Replacement lamp is type #1593. Bulb life is approximately 200 hours.

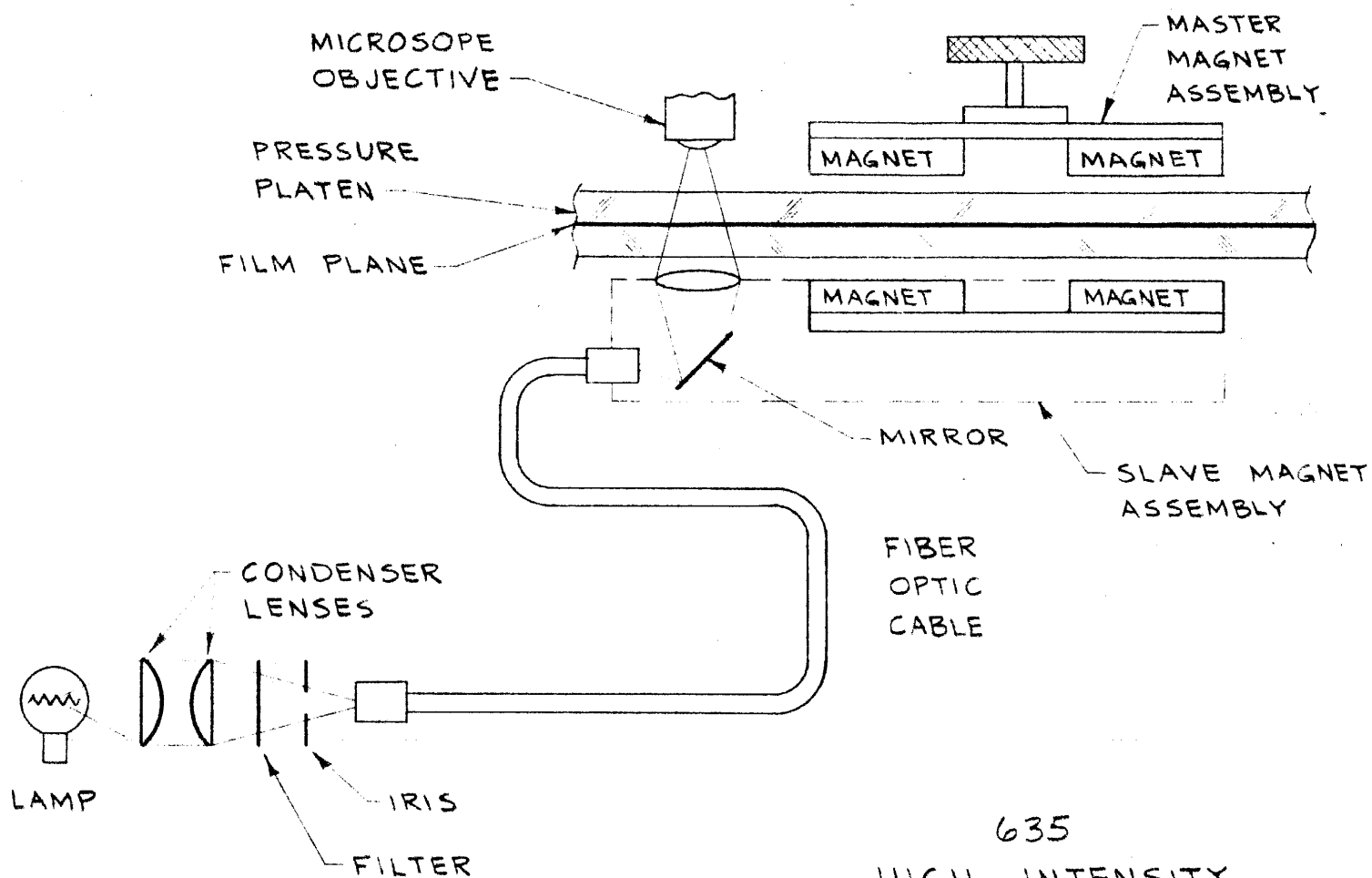
After bulb replacement, it may be necessary to adjust the radial position of the end of the fiber optic cable. This is done by loosening the four screws which hold the cable mounting plate and shifting it until maximum spot brightness is obtained at the film plane. Position of this plate is shown in Figure 3.

5.4 Fuse Replacement - Fuses are located on electronics chassis mounted on the base of the rolling frame. Replacements are as follows:

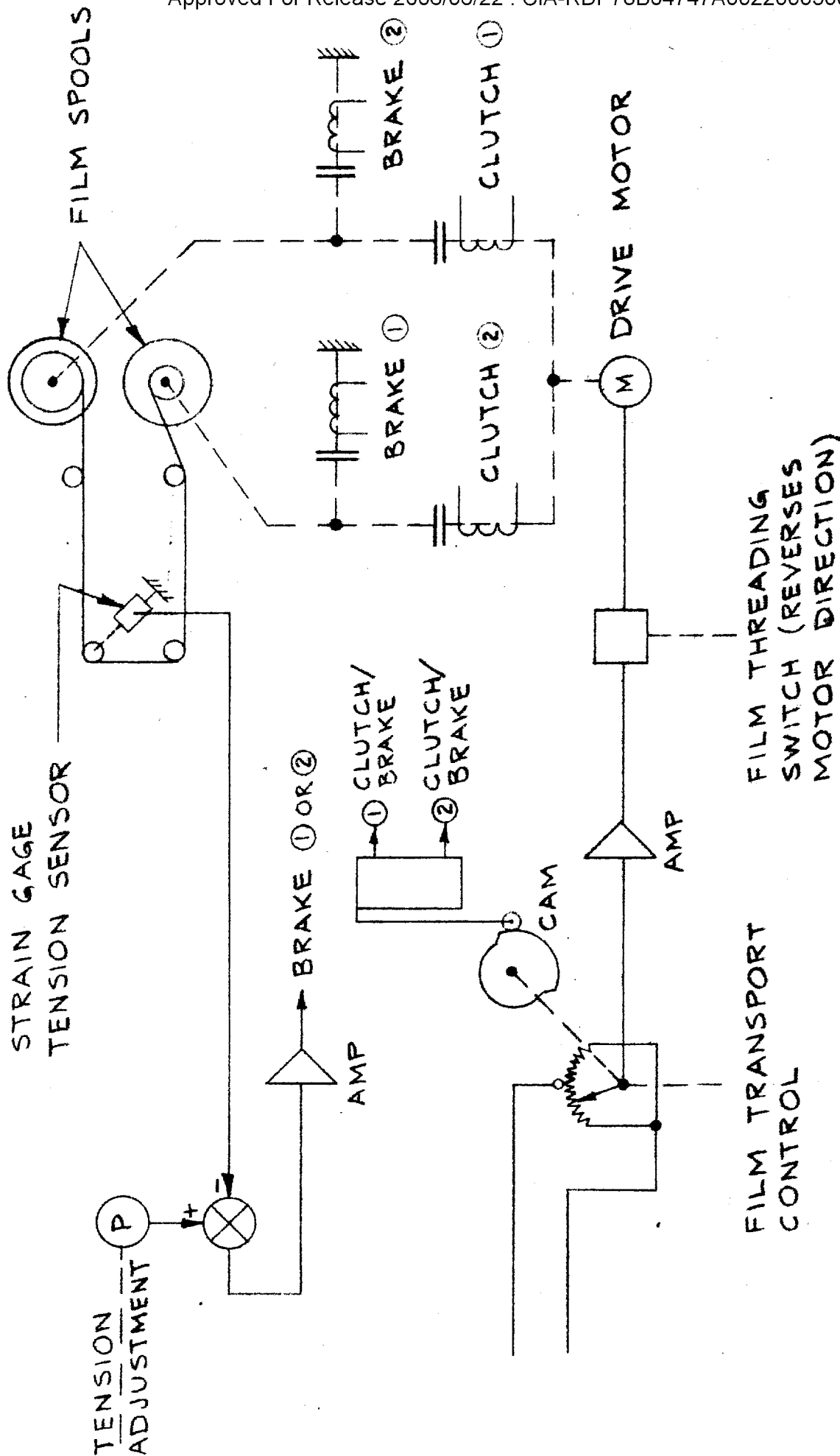
F1	-	10 amp	Type GLH 10
F2	-	10 amp	Type GLH 10

Note that frequent blowing of fuses is an indication of a more serious problem.

5.5 Pilot Light Replacement - To replace a defective pilot lamp, remove the plastic lens by unscrewing and replace bulb. Bulb mount is bayonet type. Bulb type is NE112H.



635
HIGH INTENSITY
TRACKING LIGHT SOURCE
FIGURE 1
DWG NO. 113383

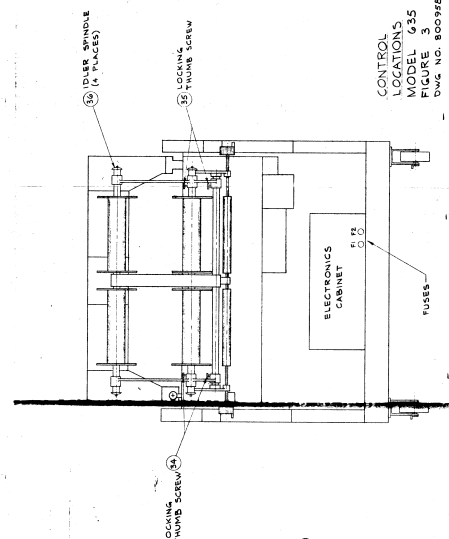
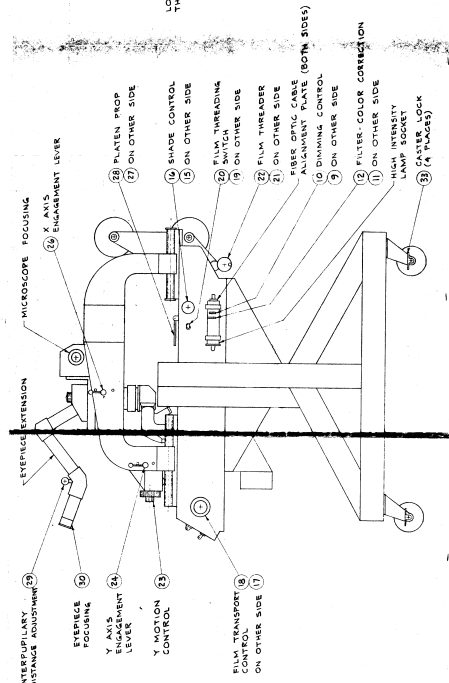
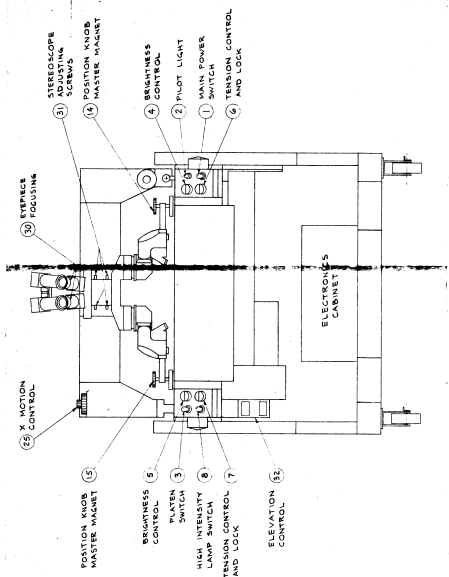


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FILM TRANSPORT SYSTEM

FIGURE 2

DWG NO. 113382



CONTROL LOCATIONS
MODEL 635
FIGURE 3
DWG NO. 800989

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